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Nominations for election into the Academy were presented from the Council.

In accordance with the recommendation of the Finance Committee, a special appropriation of five hundred dollars was voted for the engraving of plates to complete the publication of Dr. Storer's Memoir on the Fishes of Massachusetts.

The following gentlemen were elected members of the Academy: —

Dr. Gustavus Hay of Boston, to be Resident Fellow in Class I. Section 1.

Dr. Richard M. Hodges of Boston, to be Resident Fellow in Class II. Section 4.

Mr. Charles S. Peirce of Cambridge, to be Resident Fellow in Class III. Section 1.

Five hundred and seventy-eighth Meeting.

February 12, 1867. — ADJOURNED STATUTE MEETING.

The PRESIDENT in the chair.

The Corresponding Secretary presented letters from Mr. C. S. Peirce and Dr. R. M. Hodges in acknowledgment of their election into the Academy.

The Committee appointed at the Special Meeting, May 8, 1866, to consider and report on the accommodation of the Academy, were discharged.

Professor Lovering reported from the Rumford Committee that the Medals voted to Mr. Alvan Clark were ready for presentation to him.

Five hundred and seventy-ninth Meeting.

February 26, 1867. — SPECIAL MEETING.

The PRESIDENT in the chair.

The President called the attention of the Academy to the recent decease of Dr. Henry Bryant of the Resident Fellows, and of Dr. Alexander Dallas Bache of the Associate Fellows.

Professor Lovering reported from the Rumford Committee the completion of the Medals awarded to Mr. Alvan Clark, and placed them in the hands of the President. In presenting them to Mr. Clark, the President addressed the Academy as follows: —

GENTLEMEN OF THE ACADEMY: —

Three quarters of a year have passed since, by your unanimous vote, the Rumford premium was awarded to Mr. Alvan Clark. It will be very proper, therefore, now that the gold medal and its silver duplicate are before us, briefly to rehearse the grounds upon which the Rumford Committee recommended, and you decided, to mark by these *insignia* your appreciation of the service which Mr. Clark has rendered to astronomical science in the perfecting of its most important instrument of research, the lens of the refracting telescope.

The two great classes of telescopes, reflectors and refractors, labor under difficulties of construction peculiar to each; and one class or the other has enjoyed the preference of astronomers, according to the degree in which these difficulties have respectively been overcome.

In the refracting telescope the obstacles are, — 1. the want of homogeneousness in the glass; 2. the dispersion of the substance; and 3. imperfection in the figure of the lens. If the first of these difficulties has been reduced to a minimum by a selection of the best materials, then the artist has to contend with the other two. He must give to the four surfaces of his compound achromatic lens such shapes as will produce the maximum of distinctness and the minimum of discoloration in the image of the object seen through it. After all has been accomplished which can be expected from a faithful adherence to general formulæ, the last degree of perfection will depend on the skill of the artist.

Now, just where most artists have supposed that their work was done, our associate has thought that his had only begun. Selecting either a real star, or for greater convenience substituting a fictitious one, he now enters upon an examination of his lens, ring by ring, ascertaining by an ingenious test which *annuli* have too long and which too short *foci*. The lens is then dismounted and retouched at the defective places, is examined and retouched again and again, until his simple test assures him that every portion will converge the rays to the same focus. The long underground tunnel which Mr. Clark has excavated on his grounds, communicating with his workshop, is an original contrivance for providing a fictitious star, for converting day into night, so that he may examine and repolish at any hour; it also provides a sufficient space filled with homogeneous air, much better adapted for nice observations than the external atmosphere. All this is what is meant by Mr. Clark's *method of local correction*, for which the Rumford premium was awarded. The late Mr. Fitz of New York also used a method of local correction. But he retouched only one surface of his compound lens, and was therefore obliged to leave it with such irregularities as must result from the local working; as it could not be returned to the tool upon which it was originally polished, without rapidly losing all the advantage gained by the local treatment.

Whenever Mr. Clark dismounts his lens and retouches it, he separates the component parts, and applies his local correction to each of the four surfaces. These will tend to fall back to the primitive figure, but, while the elasticity of the tools and the lens together suffice to prevent a very rapid change, under Mr. Clark's skilful and delicate handling he allows for and guards against this by a slight excess of local working. It is, therefore, to this nice, artistic handling that our associate's lenses owe, in no small degree, their pre-eminence.

The justification of the Academy's award is found in the importance and the originality of this method of local correction.

Its importance is assured and measured by the fact that by it a lens of 18 to 20 or even 24 inches' aperture is as manageable under construction now, as 9 to 12 or 15 inch lenses lately were without it. Through this invention and the consummate skill by which it is turned to account, supremacy in this high art, which lingered long in London under the influence of the Dollands, and then deserted its ancient home for Munich, has now confessedly taken up its abode with us in Mr. Clark's unpretending but most efficient establishment at Cambridge.

The originality of the invention will hardly be questioned when it is known that Foucault, as recently as 1858, tried something of the same kind on the single surface of a reflector, with fine results, and then suggested its application to lenses, in honest ignorance that this was what Mr. Clark had been doing for ten years, and in the most delicate and refined way.

In the administration of Count Rumford's trust, the Academy could take notice only of such work as comes within its specific terms, and could adjudge his premium solely in regard to the absolute merit of some particular invention. It could take no account of the difficulties and disadvantages under which Mr. Clark has struggled on, — without early scientific training, without access to any of the gathered experience which is handed down in optical workshops, without having seen before any, even the commonest, process which he had to execute, with little means of knowing what had already been done, much less how it had been done, without even encouragement until after success achieved made encouragement superfluous, earning by daily toil in one fine art the means and opportunity of developing his genius in an equally refined and to us more important one, — we must allow that where moderate success were highly praiseworthy, the exquisite and unprecedented results which our associate has reached are worthy of double honor.

Nor could the Academy in its award take cognizance of the well-known fact that Mr. Clark's skill and success, not to say genius, in using his telescope are rivalled only by that displayed in perfecting it. Yet this might fairly have been introduced as testimony. For the prompt and brilliant discovery of the before invisible companion of Sirius, and the detection of more than a score of new double stars in the quarter of the heavens which had been most diligently searched for them, especially that most delicate of observations in discovering the companion of v Herculis, having been made by our associate with his own glasses, and mostly in testing their power, — these should be received as direct witnesses to the importance of his inventions, showing, as an experienced astronomer has remarked, " that objects of great difficulty and delicacy may be detected with *very perfect telescopes* of smaller size, which have escaped the most diligent scrutiny with far larger instruments " ; showing also, perhaps, as the same astronomer suggests, in reference to stars which, after withstanding the Pulkova fifteen-inch refractor, Mr. Clark proved to be double with his object-glass of only half that diameter, " that his eye as well as his telescope must possess an extraordinary power of definition."

It is a satisfaction to know that, in an art where genius is so rare, it is sometimes hereditary; that, in this instance, the sons are the compeers of the father; so that, where much has already been secured, still more may be expected. So that now, as the Academy consigns these medals to your hands, Mr. Clark, it gives with them not only the heartiest congratulations, but also the wish and hope of your assembled associates that you may long enjoy the honors you have worthily won; that you may add to them many other triumphs of skill; that you and your sons with you, and in the course of nature after you, may prolong and enhance the reputation of the establishment at Cambridgeport, so that in future years it may contribute largely, as it now does, to the honor of the country and the advancement of astronomical research.

Mr. Clark responded in the following remarks: —

MR. PRESIDENT AND GENTLEMEN OF THE ACADEMY: —

I know not how I can better express my gratitude for these honors, than by giving some brief account of the manner in which my efforts as a working optician were commenced and have been carried on.

Up to 1844, and when more than forty years of age, I had never witnessed or attempted the grinding of a lens of any description. My elder son, George B. Clark, then a youth of seventeen, during a school vacation, sought amusement in casting and grinding small reflectors for telescopes; and without any thought or design beyond assisting him to find interest and instruction in his pastime, I joined him.

After working, and talking with astronomical friends, and consulting books, until we found that reflectors, even when wrought with utmost skill, were little sought for, I proposed to the youth to try a refractor; but he objected by saying, "The books represent it as a very difficult thing."

Materials were however procured, and the attempt made, with such results as to induce a repetition, and finally another, until it became a settled occupation for us both. Thus it began, as boys' play, and so far as my own spirits and feelings have been affected by it, it has been boys' play all through. So I cannot appeal to your sympathies by any gloomy tale of disappointment or privation.

Hope and courage have been well sustained, and though my circumstances were such that I could not go far, unless purchasers for my lenses could be found, I was fortunately soon able to give them a character which insured their sale.

There exists among the double stars such a variety, in distances and magnitudes, that tests for the excellence of telescopes of different dimensions are always at hand; and through them the value of a glass can be made known, pretty accurately, to a distant correspondent, who has had experience, and is well versed in such matters.

The evidence must, of course, have more weight if the stars selected had never found a place in Struve's or any other catalogues, and were of a character making very sharp defining necessary to exhibit them.

It was in this way the attention of the Rev. W. R. Dawes of England was first called to my seemingly incipient, obscure, and humble labors. I have since sold him five object-glasses, of from seven and a quarter to eight and a quarter inches' aperture, and his published reports upon their qualities have brought orders enough, for a number of years past, to secure for me, in making proficiency, the full benefit of an abundant practice.

The need of sympathy and co-operation from those nearer home, which was sometimes pressing at the outset, was thus, through the influence of Mr. Dawes, greatly alleviated.

I never suffered from the lack of good wishes, but a lack of confidence in my ability to prosecute such an art to successful results prevailed for a time among those who had knowledge of my antecedents.

In April, 1860, an order came from the University of Mississippi for an object-glass of unusual dimensions. In undertaking this it became necessary for me to remove to some more commodious place than the one I had previously occupied. In the same month a site was selected, and dwellings and a workshop erected in the course of the ensuing summer. The material was ordered from Chance & Co. of Birmingham, and preparations made for the work.

This lens was completed in the autumn of 1862, when all communication with Mississippi was cut off. Fortunately they had paid nothing upon it, and I felt at liberty to put it in the market.

George P. Bond manifested much interest in it, visiting me repeatedly while my rough proving tube was in such a position that he could deliberately examine the great nebula in Orion through it; and he placed his opinion of it on record, at the next meeting of the visiting committee, by recommending its purchase for the Cambridge Observatory, and measures were soon on foot for raising the money. When the sum of $ 4,500 had been reached, and my expectations were centred in that direction, I was suddenly and most unexpectedly called upon by a purchaser from Chicago, with a tender of the full price I was to have received from Mississippi. With the assistance of my sons I have since made a mounting for it, and put the instrument up at the Chicago Observatory, where Professor Safford has it in charge.

It was with this glass that my younger son, Alvan G. Clark, discovered the companion of Sirius, on the first occasion of its being looked for, and before the star had been in the field three seconds. Through this business I have been made acquainted with many of the great and important facts in astronomy, and the laws of light and vision, branches wonderfully calculated to arrest and occupy the attention, in certain stages of mental development, especially when faith in the universality of God's providence goes with them.

The respect and companionship, in a degree I never could have anticipated, of those who dwell by the fountains of knowledge, have cheered me; men whose virtues and accomplishments I can never think to emulate, and whose envy, if they had any, could not descend upon me.

Mr. President, I have said nothing of methods. When first questioned by the Rumford Committee as to what was original in my mode of working, I proposed that they should visit my shop, where I could show and explain to them the course pursued, and they might judge for themselves of the value or originality of any part of it. They have done so; and I accept their decision, trusting the egotism displayed in this little history of achievements may be excused.

You will not fail to perceive, that, after so many years of hopeful, cheerful, and patient toil, mingled with no ordinary share of painstaking, a high appreciation on the part of the recipient must follow this award, as naturally as light comes with the rising of the sun.

Five hundred and eightieth Meeting.

March 12, 1867. — ADJOURNED STATUTE MEETING.

The PRESIDENT in the chair.

The President called the attention of the Academy to the necessity of some action for the accommodation of the Academy, and proposed that a committee be appointed to consider this subject.

On the motion of Professor Rogers, it was voted, that a committee of three be appointed, and on the nomination of the President, Colonel Lyman, Mr. C. M. Warren, and Professor C. W. Eliot were chosen.

On the motion of Dr. Clark, this committee were instructed to inquire concerning the co-operation of other societies in providing a building for their common accommodation.

The following paper was presented.